

THE UK FEED-IN TARIFF: A USER SURVEY

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Working Paper

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Special thanks to Laura Fosh at Gemserv, Professor Andrew Jones and Dr Paul Elsner at Birkbeck College and all interviewees and reviewers who generously gave their time and expertise.

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Summary

The UK has had a feed-in tariff (FIT) for almost one year. In that time there has been a great deal of activity and interest in areas technical, administrative, political, economic, social and financial. This policy has had many notable individual and collective effects. It is evidently acting as a connecting policy – linking people, policy, energy and economy. The FIT provides a case study in social and economic change through policy, an expression of people's values, aims and ambitions, whether financial, social or environmental, whether personally or collectively focussed, or both. It can achieve so many policy goals and social goods that it can be thought of as the Swiss Army Knife of energy policies.

In the 30-plus interviews undertaken for this study, the voices of government, business and the public were heard. The government clearly sees renewable energy policy in pragmatic economic and industrial terms. Business and financial interests see profit and PR potential. Citizens, communities, charities and local councils see it as a way to achieve their social and environmental aims. The satisfaction of all of these interests lies in sufficient financial incentives, skilful policy design, slick administration, clear communication and ongoing attention to outcomes. It is a complex, politically and financially delicate subject, but the willingness of all actors to participate and to an extent collaborate, is seeing success on a number of measures.

However, success in deployment terms is relatively simple, given a high enough rate of return and a low impact, affordable, standardised, user-friendly technology. The further one goes towards higher impact, higher cost, higher administrative complexity and more specialist technology, the lower the deployment levels. Solar PV, therefore, is doing well. Anaerobic digestion (AD), small hydro and micro-CHP are seeing low levels of deployment, while small wind is making steady progress.

Job creation tends to follow deployment. It is occurring most notably in the solar sector, both in production and installation. Domestic manufacture of wind and hydro equipment provides a base from which to develop, while micro-CHP and AD need to get on a firmer footing to see the sector grow.

Investment levels are so high in solar that the government has stepped in ahead of schedule to review tariff levels, and to explore why AD is moving so slowly. The UK FIT effectively has a cap of £360 million by 2013/14. This may be dominated by institutional investors seeking high returns from large scale 'solar parks' unless an intervention is made which reduces incentives as the scale of installations increases. Various pros and cons pertain to this matter. The same is true of the rent-a-roof market, wherein a company will offer to install and maintain solar on the roof of a homeowner or business. The company claims the FIT while the roof owner gets free electricity during the day.

Financing renewables under the FIT is a somewhat vexed question, but due to the attractive rates for solar, many creative ways have been found for freeing up capital or acquiring credit. High street banks have yet to offer any tailor-made financial products for PV in the same standard way that they do for cars.

The cost of the FIT is of major importance in the fuel poverty debate. There is a standard criticism of FITs that says that they are a tax on the poor, who spend a higher percentage of their income on fuel than do wealthier people. This is countered by the various groups now mobilising the FIT to provide renewable electricity for social housing. Some large institutions have already begun work on major solar retrofit programmes. If this can be combined with effective energy efficiency measures, possibly through the forthcoming 'Green Deal' policy, it could provide a strong policy combination which would dramatically lower energy use and domestic CO2 production.

Behaviour change is one of the desired outcomes of this policy on the part of the government. People who are aware of the technology on their property and understand both how to use it, and its relationship with their bills, tend to rapidly become strict energy users. Education and awareness are also being delivered through schools as they make use of the FIT to install PV. They get the double benefit of the electricity during the day, and a guaranteed income stream, as well as the opportunity to bring climate and energy issues to life. They may even help to present early career options for the children.

The matter of careers will very much depend on the future shape of the industry. Drawing on conversations with government figures, it was clear that a highly pragmatic view has been taken of the role of renewables in UK industrial policy. Where UK PLC holds a degree of competitive advantage, strategic efforts are being

made to create new intellectual property and export industries. This is therefore technologically limited, and where the UK cannot compete with incumbent manufacturers, they are inviting them to establish plants here in order that UK workers can at least exploit opportunities in part of the value chain.

Overall, the picture is still one of uncertainty, where there should be certainty. How quickly the government and industry can establish a stable environment in which to invest is unknown. At present, the stop-start nature of renewables development that has dogged the UK for decades remains the reality. The many interests looking to participate in this market, either as buyer, seller or maker, cannot do so without the government setting out a strong and stable framework for the foreseeable future.

Introduction

This study explores the implementation of the UK feed-in tariff (FIT), as experienced by those who are working with it directly, whether they are householders, community activists, social entrepreneurs, farmers, investors, or industry or government figures. It looks at the responses of these groups to the opportunity to make a cost-effective investment in small-scale renewable electricity generation, as well as the main issues arising from the first year of the policy's life.

The feed-in tariff is a guaranteed price policy, and is commonly found to be the most effective policy mechanism for accelerating the deployment of renewable energy.¹ Its central purpose is to create stable investment conditions, in order to establish markets, reduce costs and drive technological innovation. It also invites participation from all corners of society in the low carbon transition, as well as offering the potential for enhanced energy security, new industrial development, intellectual property and export markets.

Anglophone countries have generally had a slow response to the feed-in tariff. What set the Germans on a path to huge industrial development in alternative energy, just an hour's flight from London, had been studiously ignored by UK governments for nearly 20 years. Despite the urgent need for new energy supplies, industrial reinvigoration and decarbonisation, the UK's renewable energy policy has been, hitherto, a largely uninspiring subject.

Therefore, the UK's 2010 feed-in tariff for small-scale renewables was a relatively unexpected development. When this author, working for an NGO called the World Future Council, began researching the subject in 2006 for a 'best policy' study, there seemed to be little general knowledge of the FIT in the UK, and even less agitation for its introduction. The Labour government of the time had been staunchly opposed to the concept, and the long list of parliamentarians, academics, NGOs, renewable energy industry figures, investment bankers and others who supported the idea appeared resigned to this fact. However, it was also clear from talking with them that a wide and deep constituency of supporters and beneficiaries did indeed exist, and therefore that political action could succeed.

By early 2007, this author had produced the first book on the subject, *Feed-in Tariffs – Accelerating the deployment of renewable energy* which was sent to ministers and civil servants; letters were written, meetings took place, other political parties, NGOs, interest groups and journalists were contacted. The notion of campaigning for a small-scale FIT was first mooted by an academic immersed in UK energy policy, Dr David Toke of Birmingham University. He attended all the early meetings to make the case that a FIT would get renewables moving better than the existing policies and measures.²

The government then opened a consultation on reforming the UK's major renewables support scheme, the Renewables Obligation (RO). The opportunity was taken to commission a report from Dr Toke on a small-scale FIT for the UK, and submit this to the consultation. For the introduction of the study, *Making the Renewables Programme Fitter*, 29 signatures from the above interest groups were gathered, signing on to a statement that they support the introduction of a UK feed-in tariff for small renewables.³

This formed the very start of the snowball which gathered in size and pace over the next two years. The Renewable Energy Association (REA) and Friends of the Earth (FOE), working closely with the member of

Parliament Alan Simpson (Labour), spearheaded the campaign. A core group of larger NGOs were joined by parliamentarians from all major parties, the renewables industry and various interest groups, from farmers and retailers to charities and celebrities. In early February 2008, Alan Simpson MP introduced an Early Day Motion (EDM), a parliamentary tool to show support for a particular policy view. EDM 890 was signed by 281 members of parliament, and was the second most popular EDM during that session of parliament. This helped the idea propagate further within Westminster. Events were held, speeches given, articles written, and ultimately, the argument was won. The UK could not drive small-scale renewable energy generation with a broken microgeneration grant scheme that had run out of money. No-one could create a market out of thin air.

A seminal moment came in October 2008 when the government launched a new cross-cutting department, the Department of Energy and Climate Change, or DECC. Within the first two weeks of its existence, the new Secretary of State for DECC, Ed Miliband (Labour party leader at the time of writing) announced the introduction of a FIT for small-scale renewable energy, to be enacted using enabling powers set out in the Energy Act 2008. The scheme was set to be introduced on April 1st 2010. The department worked feverishly to design the scheme, influenced heavily by the REA working groups and their detailed policy blueprint. As with any area of policy, the government had to manoeuvre between the various suggestions, recommendations and demands of different interest groups, but what emerged was something that most seemed satisfied with.

The political process to get the policy in place will, as in any complex, consultative, multi-stakeholder undertaking, be remembered and described in different ways by different people – and there were many other interventions in public and behind the scenes – but it can be summarised as a determined joint effort by a coalition which remained largely united and consistent.⁴

Rationale

How did the Labour government of the time explain their volte-face? As is common to such policy turnarounds, they did not. However, they were very clear about their objectives, which they set out in the 2009 UK Renewable Energy Strategy. The strategy forms part of the UK Low Carbon Transition Plan. In the strategy it states: “Our goal is to maximise the environmental, economic and employment opportunities for the UK from renewables. We want the UK to be the location of choice for inward investment and a world class centre of energy expertise. This Strategy ... will enable us to build the UK low-carbon economy, promote energy security and take action against climate change.”⁵

In this paragraph, many of the key messages from the 'modern' environmental movement are present, and it encapsulates the argument, related to various types of 'green' national investment, that not only is it ecologically necessary to establish a sustainable energy system, but it is economically beneficial to society, and the national interest at large.

Energy security is perhaps the dominant issue in the UK context. It has been said that FITs are seen as being for “hobbyists, not lobbyists”. In other words, they are of marginal interest for policymakers, whereas delivering large amounts of generation capacity is the critical business at hand in Westminster. The sense gathered from the interviews conducted in the course of this investigation is that both the present and former governments are strongly in favour of finding ways to support the development of new nuclear power stations in the UK. A press officer for DECC stated in an interview that “we have to have nuclear” in order to cover the energy gap that will exist in the coming decade due to old power stations being decommissioned.

Opponents disagree, pointing out that nuclear power stations are too expensive, are effectively uninsurable, take too long to build, have a habit of going way over budget, and cannot be built, run, decommissioned and have their waste dealt with in the absence of public subsidy. They also point to increased cancers downstream of nuclear plants, security issues, problems with uranium supplies and other technical, financial and health problems associated with the industry. Finally, there is the problem that after 60 years of subsidising nuclear power, it has the historically unprecedented claim of being the only energy technology to consistently become more expensive over time, rather than cheaper.

However, the tussle over this technology is too complex to detain us further here. Suffice it to say, if the government is truly wedded to a new nuclear programme, it would explain the relatively modest ambitions of

their current programmes, and their somewhat restrained rhetoric on renewables. Certainly if one compares the experience in Germany of taking forward a renewables programme with the UK, it is clear that ambition and industrial renewables development in the UK are dwarfed by that of Germany. Again, this is a rich area of debate, which we cannot enter into here in detail, but for the sake of context it is useful to bear in mind.

If one was not aware of the history of renewable energy policy in the UK, the context at the larger end of electricity generation technologies, or the achievements of other industrialised nations, the announcements would certainly appear reasonably enthusiastic, pro-active and to be evidence of joined-up thinking. The 2009 Renewable Energy Strategy states that the new policy direction has several key aims:

- Put in place the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between now and 2020
- Drive delivery and clear away barriers
- Increase investment in emerging technologies and pursue new sources of supply
- Create new opportunities for individuals, communities and business to harness renewable energy⁶

Investment, finance, deployment, diversification, innovation and participation are the policy keywords emerging from these statements. This is reinforced by many relevant documents, including the February 2010 Impact Assessment for the FIT, which begins by asking, 'What is the problem under consideration? Why is government intervention necessary?' It answers, "Our 2020 renewables target requires all parts of society to make a contribution. Experience with existing policy measures (in particular the Renewables Obligation) suggests that businesses, organisations and individuals outside the energy sector require a simple, accessible policy framework to encourage them to take up renewable electricity generation".⁷

It goes on to discuss an informal national community of new energy generators, "Bringing electricity generation closer to the public and involving individuals, communities and businesses as producers of energy (in addition to their usual role as consumers) means that people can make an active contribution to our energy and climate change goals. Government and Parliament has shown a desire to involve individuals and communities in small-scale electricity generation by making it cost-effective for them to do so."⁸

A host of other non-monetised policy benefits include: "contributing to the UK's renewable energy target; greater consumer engagement; diversifying the energy mix; reducing dependence on (imported) fossil fuels; greater energy security at the small scale; business and employment opportunities in developing and deploying renewable technologies; reductions in losses through transmission/distribution networks; innovation benefits and potential reductions in technology costs as a result of roll-out".⁹

Numerous times in the above documents, reference is made to the need for a simple, accessible system, which the public, and other non-traditional potential energy producers, can engage with. Leading up to the campaign work, there was ongoing criticism within industry, NGOs and other interest groups, of the complex, ill-fitting or unstable tools available at the time. The official recognition of this can be read in different ways. Given the government's opposition to the FIT concept for so many years, it does appear somewhat disingenuous that those responsible for a widely criticised support scheme such as the grant scheme for microgeneration, under the Low Carbon Buildings Programme (LCBP), could suddenly have such clear-sightedness on the issue. It is more likely to be the result of political priorities changing, and capacities being activated both within government departments and between government and interest groups. The consultation process can be effective when it is truly receptive and determined to achieve success in a complex area. However, a great deal of cynicism does exist concerning government consultations, especially in the NGO sector. This is unsurprising in view of harsh court judgements against the government's process on the nuclear issue, when Greenpeace took the government to court over their handling of the 2007 nuclear consultation, which the judge called "misleading", "seriously flawed" and "procedurally unfair".¹⁰

Some of the 'big six' energy companies in the UK also have a problem with public trust, given that most of Germany's 'big four' trade in the UK – E.ON, RWE, Vattenfall (of Sweden) and EnBW (part-owned by France's EDF) – and in 2007 were exposed publicly as engaging in cartel behaviour for a number of years. The German cartel office assembled evidence of price fixing and anti-competitive behaviour, which was published in the German newspaper Der Spiegel.¹¹

In terms of some key quantitative outcomes, the consultation response document states that: “It is expected that by 2020 the scheme will support over 750,000 small scale low carbon electricity installations and will have saved 7 million tonnes of carbon dioxide”.¹² The Impact Assessment anticipates an estimated resource cost of £570m in 2020, and £8.6bn cumulative to 2030. “The estimated cost to consumers, cumulative to 2030, is £6.7bn. This leads to an average increase in annual household electricity bills of approximately £8.50 over the period 2011-2030”. In response to enquiries on current costs to household bills, a civil servant at DECC stated that “it would be extremely difficult to disentangle the effects of FITs policy specifically on bills”.¹³

DECC have produced a report on *Estimated impacts of energy and climate change policies on energy prices and bills*, in which they say, “There will be a variable impact on households owing to differential take up of energy efficiency, renewable heat and micro-generation measures – by 2020 it is estimated that households will see a decrease in bills by an average of approximately 25% if they take up both renewable and insulation measures (compared to a bill with the impact of policies)”. However, the report caveats this with “Analysis of price and bill impacts is inherently uncertain and sensitive to underlying assumptions. The primary driver of energy prices and bills is not energy and climate change policies but rather changes in fossil fuel prices (gas, coal and oil), which are the primary drivers of wholesale energy costs and currently make up around 60% of domestic energy prices”.¹⁴

Undoubtedly there will be political pressure over the additional costs to energy bills from renewable energy, but the pro-renewables side has as good a case as it needs. The energy transition has to happen, and soon, whether anthropogenic climate change is disputed or not. There has been much written on 'peak oil' in recent years, and there remains an enormous challenge in replacing this energy source. Diversification and rapid renewables deployment are essential, not least for national and international security. The debate over going 100% renewable is too big for this investigation to consider, but again, there are many reports and books addressing it.¹⁵

One of most common mistakes made in reporting on FITs in the media concerns the term 'subsidy' (even minutes after this sentence was written it was used in a radio news item by the BBC). This must be corrected because such an inaccuracy obscures the purpose as well as the nature of the scheme. A subsidy is something paid by government in the national interest, for areas such as transport and agriculture, and tend to be things that become relied upon for income in struggling markets. A feed-in tariff, however, is a market development tool designed to continually reduce costs and bring forward technology to a point where it can stand on its own.

It cannot be ignored that fossil fuel subsidies still number in the hundreds of billions of dollars annually. In his recent 2011 State of the Union address, Barack Obama called for these to be eliminated, with the money instead going to fund clean energy.¹⁶ Subsidies become politically difficult to remove, especially if significant numbers of jobs - and hence votes - exist in the sector. Avoiding political suicide can therefore require the defense of subsidies. In the area of FITs, it simply does not, by definition, apply. FITs are designed to reduce annually, not feather-bed an industry.

A common refrain in the renewables industry is that “we must get off subsidies”. This particularly applies to areas like tax credits, grant programmes and shorter run incentives. They cannot provide the stability which an industry needs to grow sustainably. Although FITs can deliver this stability, many supporters do not see them as a permanent fixture, but a transition mechanism to secure, smooth and speed the development of new energy generation technologies and their attendant infrastructure. There remains, however, a lively debate over how long they will be needed, and whether renewables, like fossil and nuclear fuels, will continue to receive financial support indefinitely.¹⁷

Design

The UK FIT is designed to incentivise small-scale renewable energy (under 5MW). DECC stated the intentions of the scheme as follows: “Through the use of FITs DECC hope to encourage deployment of additional low carbon electricity generation, particularly by organisations, businesses, communities and individuals who are not traditionally engaged in the electricity market. This “clean energy cashback” will allow many people to invest in small scale low carbon electricity, in return for a guaranteed payment both for the

electricity they generate and export".¹⁸ Ed Miliband (then Secretary of State at DECC) said of the UK FIT, when the rates were announced in early February 2010, "The feed-in tariff will change the way householders and communities think about their future energy needs, making the payback for investment far shorter than in the past."¹⁹

Given that the policy was designed to cater to such non-traditional generators, with a host of complex policy goals, it is important to look at the final design of the scheme.

A simple, German-style feed-in tariff will pay for all energy generated, over a long period of time, often around 20 years. It will be paid regularly to the producer by the same utility company which the producer also buys from. It will be funded by a small increase in the utility bills of all domestic electricity customers. Tariff levels will be differentiated by technology and size, to provide a fixed payment per kilowatt hour generated, according to the actual generation costs involved.²⁰ Priority grid access and no cap on the scheme are also fundamentals.

The UK system differs in several ways. Firstly, the payment is split into generation and export levels, with generation receiving a far higher return than export – 41.3p per kWh versus 3p per kWh. This is because rewarding on-site use is considered by DECC to be most efficient technically, and more likely to drive positive behavioural change in terms of energy use.²¹ The generator will also save money on electricity imports from their supplier. What emerges then, is a bias towards on-site use, making the scheme more like a production tariff than a typical feed-in tariff system.

Also, unlike the German system, the tariff payments are index-linked to inflation, meaning that the payments are guaranteed to remain stable in real terms even as the value of the national currency changes over time.²² The rate of return on investment is expected to be in the range of 5-8 percent. Another change to the German system is that the scheme is capped at 5MW for eligible installations, although there is at the time of writing some debate on switching to a FIT system for all scales. The technologies initially covered are solar PV, hydro, wind, micro-CHP (combined heat and power) and anaerobic digestion (AD). The costs are equalised among all domestic electricity consumers through a levelisation scheme.

The UK scheme is now effectively capped at £360 million by 2013/14. This represents a 10 percent cut from the original £400 million cost estimate. The reduction was announced in the 2010 Comprehensive Spending Review (CSR), and has been criticised as going against a basic principle of a market development tool such as the FIT.²³ FITs in many countries have had the same problem. If an attractive rate is set, take-up can be explosive, as investors race to secure FIT-eligible projects while the tariffs are still high – in Spain for example. However, if a rate is set too low, nothing happens. Rate-setting for FITs is therefore something of an art, and such a dynamic market and policy environment requires constant monitoring and regular review to balance costs with benefits.

Similarly, with banding – paying a set rate for ranges of installation sizes - it must be recognised that there will often be people with capacities either side of each range and their associated tariff levels. What is important is to find the levels which work in the majority of cases.²⁴ See the appendix for the table of initial FIT bands and rates.

The next section describes how the scheme is administered, included an example of the installation, certification and registration processes, showing how all actors interact.

Administration

The FIT scheme requires several agents to undertake roles in its administration, namely DECC, Ofgem, Genserv and the energy companies. DECC originated and designed the scheme and its accompanying legislation, in consultation with many stakeholders, principally from the renewable energy industry.

Ofgem (The Office of Gas and Electricity Markets) is, as the name suggests, the national regulator for gas and electricity, and as the 'Authority' they perform a number of key tasks in the process. They set up and run the Central FIT Register (CFR), and have a statutory obligation to publish certain statistical information from it, including the cumulative number of installations receiving the FIT. The CFR is intended to "ensure

compliance, mitigate fraud, find errors and facilitate switching".²⁵ They also administer the levelisation process, which effectively equalises the extra cost of the FIT scheme, sharing it "equitably amongst all holders of electricity supply licences in proportion to their share of the electricity supply market".²⁶ Further, Ofgem is tasked with administering the accreditation of installations above 50kW, or AD installations of any size. Finally, they hold responsibility for ensuring compliance with the scheme on the part of suppliers.²⁷

Gemserv, a consultancy, is the Licensee for the MCS (Microgeneration Certification Scheme). The MCS is a quality mark for renewable technology installations and products, and is led and funded by the industry itself. The MCS products standards reference European Union standards, and cover both product testing and also the aspect of Factory Product Control, which ensures that the products manufactured are of the same quality as the ones that were tested.²⁸ Crucially, in order to qualify for the FIT, an MCS certificate must be granted. This is to ensure safety, reliability and consumer protection. People can install without MCS certification, but they will not be eligible to receive the FIT.

Gemserv were licensed to grant the MCS Mark by the Secretary of State for Energy, and to oversee and administer the MCS. This arrangement allows for there to be multiple certification bodies. At the time of writing there are 14, who certificate product and installation companies to the MCS standards. These companies are themselves accredited by the United Kingdom Accreditation Service (UKAS). This opening up of the certification process to more companies has enabled a greater number of installation companies and products to be certificated.

The larger energy companies, or Licensed Electricity Suppliers (those with more than 50,000 domestic customers) must become Mandatory FIT Licensees. Smaller companies can become Voluntary FIT Licensees if they wish to participate. Both groups are known as FIT Licensees.

An example of the FIT process works as follows. A customer wanting to install PV would first contact an MCS-accredited installation company. The company will undertake a site visit and discuss financial and technical issues such as budget, energy demand, and roof space, orientation and angle. An appropriate system is then agreed, sourced, paid for, installed and connected to the grid. The installer registers the installation with the MCS Installation Database (MID), which generates a certificate. The MCS records details of the installation, including its location, capacity, estimated annual generation and its declared net capacity. The certificate is sent to the electricity supplier, which checks its unique number against the MID. Once validated, the electricity supplier registers the certificate with Ofgem's CFR - Central FIT Register. The payments to the customer can then commence, usually on a quarterly basis. These details are recorded by Ofgem for national statistics and measuring against national targets.

At the time of writing (early February 2011), the number of MCS certified installation companies had trebled under the FIT, reaching just over 1,800, up from less than 600 when the policy began in April 2010. Around two thirds of these are PV installers. The number of certified products is now nearly 1,500. The cost of becoming a certificated installation company under the MCS can vary between £600 and £1,800 depending on which company one engages.²⁹ The MCS website carries a list of all certification bodies and the technologies they cover.³⁰

Financing

In taking up the FIT, there are widely varying levels of up front capital required for investment in the equipment. This ranges from around ten thousand pounds for domestic PV or micro-CHP, to several hundred thousand pounds for small hydro installations, to over a million for the larger end of FIT-eligible wind turbines.

What is clear is that the financing has yet to catch up with market demand. For PV, no tailor-made financial products from high street banks were found. Other than cash, the main credit options that exist for purchasing a home system are through the use of a personal bank loan or credit card. With a credit card, purchasers can shift the debt to the provider of the lowest available APR (annual percentage rate) to keep repayments down, and the payment is insured and protected.³¹ This can represent a saving on current bank rates.

According to one solar company director, the average size of domestic PV systems has risen from the 2.5kWp average of the last 10 years, to nearer 3.6kWp in the last 12 months as a direct result of the FIT. However, the same interviewee reported that the majority of their customers are from what is termed the 'able to pay' group - those with the available capital. This is often those retiring from work and using an advance lump sum from their pension to pay for the system. Another common situation is where people are downsizing their property, and investing some of the extra funds generated from buying a smaller, cheaper home. Making an 'equity release' arrangement is also being used to free the capital, with the most popular option currently being the release of equity from a pension fund for reinvestment in PV.³²

Rent-a-roof (RAR) schemes are an alternative method of acquiring a domestic PV system, and have attracted a great deal of attention already, not all of it positive. A senior figure from the Energy Savings Trust (EST), the UK's main energy and carbon advice provider, stated that the share of the UK PV market taken by RAR schemes is around 20 percent, as of early 2011. Along with greenfield solar parks, they are perhaps the most contested aspect of the FIT.

RAR schemes essentially work as the name suggests. A company will install, maintain and insure a PV system on the roof of another party, typically a private householder, a registered social landlord (RSL) or a commercial enterprise. Any roof which is appropriately situated, oriented and angled, so as to give good performance and hence financial returns, could be eligible. It of course needs to be accessible, in good condition and strong enough to take the weight of the system.

The benefits are generally agreed upon. Most interviewees responded that RAR schemes can be a good thing if you cannot afford a system yourself, or you are an enterprise which can make use of the free electricity during the day, or you are in an off-grid area and use electric heating in the day.

The roof owner therefore gains by saving money on electricity bills. On a small domestic system this could range from around £100-£150 per year. The maximum estimated saving is £412 a year, compared with £1,313 going to the renter.³³ On the face of it, this presents a win-win situation. But an article in The Guardian found that, "under the "free solar" model, a homeowner would save in the region of £2,750 on energy bills over 25 years, the length of the tariff offer. By paying for their own panels with a loan at 7.7% interest repaid over 10 years and earning income from the feed-in tariff, they could save around £6,506 over the same period".³⁴ The most common view from interviewees was that if people can possibly afford the system, and don't think they will move house for some time, they should invest themselves, rather than rent their roof.

However, there are a number of concerns voiced by commentators and journalists on the RAR schemes. The consumer protection group Consumer Focus produced a factsheet on the FIT which raises 24 questions which consumers should ask when looking into these deals.³⁵ They cover sections on financial benefits, financial risks, installation, and ownership and maintenance.

A key question is, what if the house is sold? After all, the average time spent in a house is seven years, and the tariff is for 25 years.³⁶ According to a senior figure at British Gas New Energy, the largest player in the RAR market, under this scenario, by default, the PV and the FIT system remains with the property. If the property owner sells it as a package, the buyer has to inform the energy supplier they are the new owner, and prove this. If the seller wishes to retain the system, they would have to make a contract with buyer, and sign a right of payment for other people.³⁷

Interestingly, British Gas, and other major energy companies, are now moving from purely supply to being 'energy service companies', or ESCos. This reflects the fact that energy is becoming an increasingly complex field in the low carbon era, requiring major adaptation from traditional business models. Domestic energy suppliers with more than 50,000 customers are obligated under the government's CERT (The Carbon Emissions Reduction Target) scheme to help reduce household CO2 emissions. By doing so they automatically help reduce energy bills and fuel poverty, increase energy security and support green job creation.³⁸ They have used methods such as providing free energy saving lightbulbs in the past, but the FIT presents an opportunity to achieve their obligations while making money for themselves.

Social enterprises are also emerging which seek to use the FIT for creating multiple socio-economic and environmental goods. For example, Empower Community Fund have a model where they can bridge the gap between communities and large institutional investors, split the FIT receipts between both and also generate their own funding. They believe the FIT offers investors a strong covenant that raises the overall standard of

community energy projects, and allows pension funds and the like to more ethically invest, and provide both national and local economic benefits.³⁹

Another community power advocate reported that in looking at small projects, the project costs - including due diligence, site visits, reports and so on - have been prohibitive, and banks have seen the payback as too little, over too long. The community power group he works with in Bristol have been exploring a bond system to bridge the financial gap, but says government could do much more to help in this area. On the positive side, he said that when running information stalls at community events, his organisation had found that the FIT allowed conversations on energy to open up because people are interested in finding out about solar power. People approach the stall to talk about the solar panel on display, and often end up installing insulation if nothing else.⁴⁰

Schools are important communities, especially around energy use and education. Haslemere School in Surrey has installed a PV array under a pilot programme initiated by the London Mayor's Office to help raise public awareness on energy and climate issues throughout the boroughs of London. A local group, Sustainable Merton, put together the bid and helped facilitate the application. They also did local surveys to gauge local understanding of energy issues. This was important as the school is in a low income area, and sustainability is generally a much lower priority for poorer sections of society. The PV project therefore provides an opportunity for engagement and education, to bring the issues to life. The 10kW array will pay for itself in 9-12 years, and supply electricity for the school for the next two and a half decades.⁴¹

A point raised in a number of interviews was that the PV market, if not properly regulated, could acquire a bad name through the activities of 'cowboy' traders. The early double glazing market was rife with swindlers, unskilled installers, poor workmanship and overcharging. This nascent market cannot afford to gain a bad reputation, but quality marks such as the MCS should provide some reassurance.

In addition, the REAL Assurance Scheme aims to protect consumers. It is a consumer code which works in harmony with the MCS, covering pre- and after-sales activities, contracts, and the completion of orders. It sets out a number of stipulations governing the practices of providers, and it can support consumers in disputes with their provider, as long as they are members of the scheme.⁴²

One cautionary tale related during interviews was of a company charging a £300 fee for carrying out a suitability survey, which actually consisted of simply looking up the property online and assessing its roof orientation and angle on the free Google Earth application.

Another anecdote suggested that mortgage lenders are not keen to engage with properties which have RAR deals attached to them, due to the technical and legal complexities this introduces over ownership, insurance, maintenance and other issues.

It was further opined that when the owners of rented roofs start replacing their roofs or selling their properties, then this sector of the market will begin to reveal the relevant issues in detail, and any negative experiences will certainly come to light through the mainstream media.

A final note of warning on the RAR sector came from a commentator who said that in conversation with some financial interests that had performed due diligence on RAR business models, they saw too much risk in the long-term, and felt that existing models may not have thought through every potential pitfall.

Only time will tell which models are robust, and which providers are both competent and honest. It may be a matter of debate as to whether the domination of the market by a few large companies exploiting economies of scale stands in opposition to the principle of 'power to the people', which is seen by many as the central purpose of feed-in tariff policies. These companies are not to be confused with genuine community benefit schemes. Recent government announcements on investigating solar parks raise the question of scale directly. See the section on PV below.

The government's take on financing is that market failures have led to difficulties with project finance and equity finance in the last few years. Projects have a perceived high risk around policy, and there is therefore a government role to be played in de-risking technologies, and creating investment opportunities around bond markets and institutional investment.⁴³ They are now capitalising the Green Investment Bank, which should provide investment funding for renewable projects, but has this had to be downgraded from original

plans due to the economic climate. Detailed proposals are due to be issued in May 2011.

Technologies

So far, we have explored issues mainly relating to domestic PV. This is unsurprising given the ratio of domestic PV installations to everything else, as per the table below. It shows that domestic PV represents 24,340 of the 26,397 total installations in the first eleven months of the scheme.

Table 1. UK FIT Installation Levels (April 01 2010 to March 15 2011)

Technology	Domestic	Commercial	Industrial	Community	Total Installations	Total Installed Capacity (MW)
PV	25667	225	29	287	26208	70.55
Wind	1016	181	13	90	1300	18.34
Hydro	149	35	2	12	198	10.73
Micro-CHP	83	0	0	0	67	0.08
Anaerobic digestion	0	2	0	0	2	0.666
Totals	25548	424	42	383	26397	95.440

These data are taken from Ofgem's online FIT Installations Statistical Report, from which the charts below are generated.⁴⁴

Chart 1. UK FIT Installations (April 01 2010 to March 01 2011)

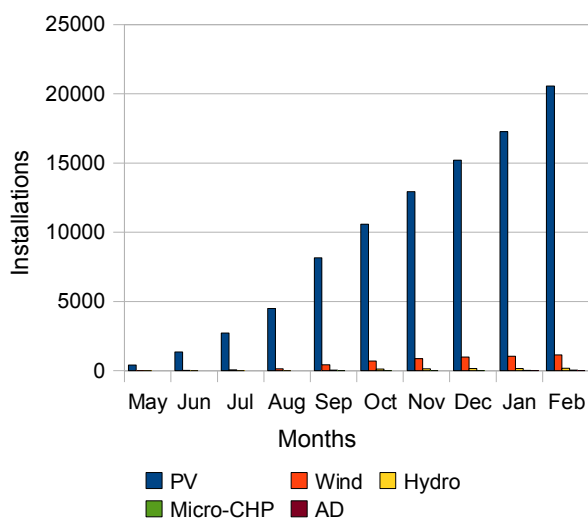
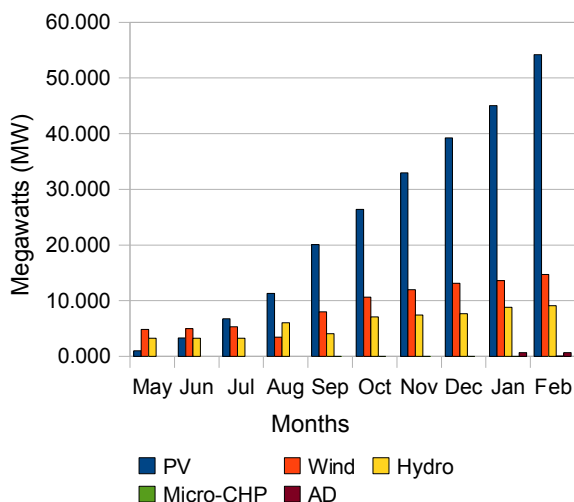


Chart 2. UK FIT Installed Capacity (April 01 2010 to March 01 2011)



From these two charts, two things are immediately clear: PV consistently has by far the highest installation levels, but wind and hydro have larger unit sizes and make up a significant proportion of the installed capacity.

Next, let us examine some of the feedback on the first year of the FIT for the various technologies.

PV

A domestic PV user reported a wide range of production and income across the year, from 20p on a cloudy Winter's day to £7 on a clear Summer's day. He made the point that there were two ways to look at the incomes, either glass half empty - 11 years with nothing, or glass half full - 14 years with over £1,000 per year income. He said that his values-driven interest in microgeneration was bolstered by the monetary sense of a long-term payoff, and this tipped the balance on making the investment decision.⁴⁵

It has been bemoaned that building-integrated PV (BIPV) has no real support under the FIT in its original form. This was raised by a solar manufacturer, and certainly the UK is off to a very slow start compared to other European countries and particularly Japan, which has around 40 percent of global installed capacity.⁴⁶ Retrofit has been prioritised under the FIT, and building stock turnover in the UK is in any case only around one percent per year.⁴⁷

Aside from the RAR schemes, social housing and domestic installations, the other notable development in the area is the debate around what is termed 'greenfield solar', or 'solar parks'. There is a deep divide in opinion when it comes to whether or not the microgeneration FIT should be used at this scale.

Proponents argue a number of points. First, keeping in mind the level of deployment required by the EU Renewables Directive, the need to cut fossil fuel use drastically and the need to plug a looming energy gap, can we really afford to keep the commercial sector out of this effort? The ability to make decisions quickly, to recognise a good investment and mobilise capital is vital in moving the sector forward. Second, the economies of scale are important in quickly bringing down the price of equipment. Third, there is a national need to keep creating jobs, to build the market and to gain the experience necessary to keep rolling out renewables. Fourth, solar parks can be hidden from view in some cases, and the land around the panels can still be grazed by animals, providing a solid extra income for farmers.

Opponents are mainly concerned that a relatively small number of interests may come to dominate the market, and collect a disproportionate amount of the FIT, skewing the market towards private interests and away from citizens and communities. In a financially limited scheme it would to an extent move solar deployment away from the urban centres towards rural areas, where very few people will be exposed to these technologies and come to recognise and accept this new direction in energy provision. Interestingly however, there seems to be an unwritten rule that renewable energy technologies should be seen in urban

areas and hidden in rural areas. Further concerns are on the competition with food crops, and on the FIT profits potentially leaving the country to pay foreign investors.⁴⁸

At the time of writing an announcement was made that the Secretary of State for Energy, Chris Huhne (Liberal Democrat party), would undertake an urgent review of solar parks and AD, within an early first review of the FIT. The press release was titled 'Huhne takes action on solar farm threat', making clear the government view of this development. The press notice quoted him as saying, "Large scale solar installations weren't anticipated under the FITs scheme we inherited and I'm concerned this could mean that money meant for people who want to produce their own green electricity has the potential to be directed towards large scale commercial solar projects".⁴⁹

The full review will be completed by the end of 2011, with no changes to tariff levels until April 2012, "unless the review reveals a need for greater urgency", according to the Secretary of State. The review is justified by two things: the need to ensure that solar parks cannot absorb too high a level of the funds expected for the scheme, and the need to ensure confidence in long-term investment planning.⁵⁰

Wind

Compared to the PV market, the small-scale wind market has moved relatively slowly under the FIT, for various reasons. Planning is required, adding time, complexity, and therefore cost to projects. A good wind resource is also vital, which is geographically limited. Further, the skills base for growth in installations has not been well prepared for a market driver like the FIT.

Analysing installation trends, the consultancy Greenbang reports that, "For the period 1 April to 1 October 2010, the total number of wind installations covered by the FIT came to 699. Of these, 634 were domestic, 57 were commercial, four community-based and four industrial installations. The total installed capacity of wind installations came to 10.59MW, or 24% of the total FIT installed capacity. Of that, domestic installations contributed 4.25MW, commercial installations 4.20MW, community installations 2.03MW and industrial installations 0.11MW. Clearly, although there are far greater numbers of domestic installations compared to the other forms, these do not necessarily contribute the greatest installed capacity, with larger commercial and community installations making a sizeable contribution".⁵¹

They predict growth in the small wind market will continue through 2011, rising to £78 million. This represents a 63 percent increase on 2010 figures. In the UK context, one advantage enjoyed by small wind over PV is that the majority of the kit is manufactured nationally. Job creation and sectoral expansion is therefore able to accelerate as the market develops. Employment in small wind is expected to rise to nearly 2,700 direct jobs by the end of 2011. Concern is expressed, however, that demand may outstrip supply if more skilled workers are not trained in the near future.⁵²

It is understood from discussions with civil servants that there will be fresh proposals made on improving the conditions for onshore wind deployment. In particular, communities, which can block development in rural areas, may be offered the two main things that they have stated in academic studies that they would like to see as a compensation for hosting a wind farm in their area. One is free or cheaper electricity, and the other is a cut of the business rates which are generated.⁵³ The latter point is in fact included in the May 2010 Coalition Agreement set out by the Conservative and Liberal Democrat parties: "We will encourage community-owned renewable energy schemes where local people benefit from the power produced. We will also allow communities that host renewable energy projects to keep the additional business rates they generate".⁵⁴

These kinds of issues - local benefits, community involvement, planning and so on - were explored in detail in a seminar series funded by the Economic and Social Research Council (ESRC) entitled 'Where next for wind? Explaining national variations in wind power deployment'. The series made it clear that for wind in particular, the FIT for small-scale - and whatever comes in for large scale - will continue to raise a variety of key issues. According to Dr Geraint Ellis, "one can see wider problems of transition to a low carbon energy economy being concentrated in, but not necessarily created by, the planning and consents process; but also that the nature of wind energy as a technology exposed long-standing tensions in the institutional design of planning. Tensions around democracy and efficiency, subsidiarity, and contested knowledge, connect very clearly to debates about social acceptability. Participation is often identified as a core value of planning, yet it is just this openness to wider viewpoints that most seems to threaten narrow, instrumental, delivery of

renewable energy”.⁵⁵

Planning as a central issue in the process comes to the fore in many such discussions, and the experiences of Germany, France and Denmark are often put forward as cases to learn from. These countries have all taken steps to create systems that use planning, as well as financial measures, to reduce local opposition. A number of such cases are reported in the seminar series proceedings, particularly seminars three and four (see endnotes 53 and 55). If government is committed to an ongoing rollout of onshore wind generation, the policy lessons certainly exist, and industry and advocates recognise a major opportunity to begin to embed the technology technically, socially, economically and politically.

AD

AD appears to face a number of issues, and its deployment under the FIT has been limited so far, to the extent that an early government review is now underway, as referenced above. The main issues seem to be with the tariff rate, and the problems of supply and demand. The tariff works for larger scale plants, but not small-scale.⁵⁶

For farmers to run the equipment profitably, they need a guaranteed supply of feedstock, as well as a sufficiently long-term buyer. One farmer commented that it is all well and good collecting cow manure in the winter when the herd is inside, but in the summer when they are out in the fields this is not viable. One solution may be to aggregate inputs from several nearby farms and share the costs and benefits. Another may be to lock local government into long-term supply and/ or purchase contracts.⁵⁷

With British farming suffering many years of economic hardship, money is in short supply. When interviewing farmers at a renewable energy event hosted by Solar Sense on Worthy Farm in Glastonbury (home of the Glastonbury music festival), a farmer commented that FITs presented “a chance to finally make some money”. Michael Eavis, the farm owner, said in conversation that he could retire on the income from the PV once it was paid off.

However, there are two factors guiding the food industry on AD investment. One is the greenhouse gas emissions produced from biomass sent to landfill, and another is the increasing pressure, backed by financial penalties, of sending food waste to landfill. Unsurprisingly, several food industry companies, including both producers and retailers, are taking a lead, with major installations being developed. With around 100m tonnes of farm wastes, food waste and sewage sludge being produced in the UK annually, there is major potential for AD heat and power production, market expansion, and carbon abatement.⁵⁸

There are decisions to be made around this technology however. The tariff rate is currently considered low for major investments, the scale of projects needs to be of a size that may require multi-farm collaborations for the requisite material throughput, and finally the biomethane gas produced could be used for either power or transport, so some decisions are required around this.⁵⁹ Food waste provides a better calorific value than farm waste, so some AD models are being changed.⁶⁰

Planning for AD is not as easy as for PV on farms, for example. There is a perceived problem with smell, and with transport of material. The Campaign for the Protection of Rural England have objected to AD on these grounds. However, these issues can be mitigated.⁶¹

Hydro

The picture of small hydro development under the FIT, as related by producers, is mainly one of stumbling blocks. Hydro producers under the FIT have mostly been moved there from the RO (called the ROO-FIT), but MCS requirements are seen as causing difficulties with approvals. Hydro also faces a number of hurdles including receiving permission from the Environment Agency, approval from the local planning authority, certification under the MCS and for electrical safety, and approval from Ofgem. For clarity, Ofgem accreditation is required for installations above 50kW, and MCS accreditation for those below 50kW.

Financing is also a major undertaking, given the considerable capital cost of equipment. Kit can range in price from several thousands to several hundreds of thousands of pounds, with systems ranging from under 2kW to over 500kW.

During consultations with government, it was argued that hydro producers should receive tiered tariffs, rather than the system of banding. Tiered tariffs would pay a higher rate for a set amount of energy production, then this would drop down in tiers. What this would do is incentivise maximum production while still controlling costs. The banding approach, it is argued, creates a disincentive to maximum production. By giving a rate attached to the size of an installation – the larger the system the lower the tariff - the economic rationale is created for producers to install a smaller system which gives them a higher tariff rate, leaving the larger potential of their site untapped.⁶² The counter-argument is that the tariff calculation is based on the economic cost of the installation and the technology, so the relative cost per kW generated for a larger systems works out less than a smaller system which is more expensive per kW.⁶³ The counter-counter argument is that tiering is designed to respond to cost and to help mitigate the large initial investment; the small plant which has a higher cost per installed kW remains on a higher tier for longer than the bigger site which had lower cost per installed kW.⁶⁴

Business rates are another contested area. Although this applies to all renewables at present, it has greater impact on hydro because mills that are homes very often have a capability of generating substantially more electricity than a domestic setting can consume. At present the Valuation Office Agency (VOA) determines that any hydro site generating more than it consumes is classified as a business, and must therefore pay business rates. As business rates are based upon rental values, the VOA is obliged to invent a landlord/tenant scenario; thus a hydroplant with heavy investment in automated controls, feedback systems and 24-hour trash rack sweeping – which all contribute to significantly improved energy capture – will be taxed at a higher rate than inefficient plants. This again creates a disincentive for maximising energy production.⁶⁵

The message from producers is that they find themselves in the middle of different policies which are pulling in opposite directions. Harmonising policy so that it creates the outcome of maximising renewable energy generation at lowest cost is the desired outcome. The clear benefit of the FIT is that it has raised public interest. For hydro it is not yet by much, as the market is fairly small, and the regulatory and administrative hurdles are significant. Project lead times can stretch to many months just in waiting for delivery of the equipment, as it may have to be made to order for the site in question. A number of other issues have been raised concerning the effects of these delays, the transitional arrangements between the RO and the FIT, restrictions on self-installation of the equipment, and fraud monitoring.

However, there are several thousand sites yet to be exploited around the UK, and the quality of the electricity is excellent in terms of being predictable, reliable and dispatchable. With time, experience and some development of the policy and regulatory environment, the sector can expect steady, if not dynamic growth.

Micro-CHP

The market for micro-CHP has moved very slowly in the first year, for several main reasons. One is the fact that it is a new technology, another is that there is only one product on the market at the time of writing, the Baxi Ecogen, and another is cost. Current micro-CHP technology has a high heat to electricity ratio, so is more suitable for buildings with a high heat demand, but this may change as technologies emerge with different ratios (such as fuel cell units), and as a result of the new Renewable Heat Incentive (RHI) policy being introduced in April 2011. The cost is also a factor, with a retail price of over £9,000 including VAT (sales tax). The FIT is at present set to only fund the first 30,000 sub-2kW units. Industry representatives would like to see an early review of the policy as it pertains to micro-CHP.⁶⁶ This will now happen within the first review, although originally it was to be reviewed after the first 12,000 units are installed.⁶⁷

Fuel Poverty

A key issue raised throughout the consultation process on the design of the FIT was the matter of fuel poverty. DECC defines the term as meaning, “Being unable to afford to keep warm. We consider a household to be in fuel poverty if it needs to spend more than 10 percent of its income on fuel for adequate heating (usually 21 degrees for the main living area, and 18 degrees for other occupied rooms)”.⁶⁸ DECC figures show the numbers doubled between 2004 and 2008, when they estimated that 4.5 million UK households were in fuel poverty. They expect the 2009 figure to have risen again.⁶⁹ Given the fresh energy price rises, the economic downturn, the enormous cuts across all areas of the national budget, and higher than expected inflation in early 2011, fuel poverty is certain to be rising still. It can be argued that if poorer

members of society pay a disproportionate amount of their household budget on energy, then they are being impacted the most by any policies pushing up national energy bills.

One counter-argument is that the FIT now makes it possible to cost-effectively invest in microgeneration for social housing. This is taking place in Birmingham, where the city council are installing solar PV on the roofs of 10,000 council homes. The FIT is used to pay back the cost of the systems, which was financed by a combination of commercial bank lending, public sector borrowing and funds from the energy companies' obligation under the 'green deal', which will be discussed below. The council, Europe's largest local authority, will reinvest the returns from the feed-in-tariff in order to fund retrofits for a further 200,000 homes. They hope to extend the scheme to ultimately install solar on all 420,000 properties in the city.⁷⁰

The scheme forms part of the council's Birmingham Energy Savers programme, helping to meet the target contained in their Declaration on Climate Change. They intend to retrofit 10 percent of homes with renewable technologies by 2015 and make a 60 percent cut in carbon dioxide emissions by 2026.⁷¹ Paul Tilsley, deputy leader of Birmingham city council, described the programme as offering "a fantastic opportunity for residents and businesses to cut carbon pollution, and save themselves thousands of pounds by reducing future bills. This scheme will significantly improve the lives of people in Birmingham, setting a green standard beyond that of any city in the world".⁷²

Peabody, a large, long-established housing association in London, is also making use of the FIT for its social housing properties. They have had an interest since 2006, when they began generating renewable energy from rooftop solar, and can now expand this dramatically. They have raised £23 million for a rooftop solar programme which should see carbon savings of around 3,000 tonnes annually. In terms of rationale, they cite responsibility towards the environment, and present and future generations, and the opportunity to set an example to residents and staff in terms of positive actions people can take. In terms of viability, Peabody's Environmental Sustainability Officer, Tessa Barraclough, states "the FIT is the funding stream for the project and was absolutely key to making this work for us".⁷³

One area getting missed is the rural fuel poor.⁷⁴ As mentioned in the section on RAR schemes, this group could particularly benefit from the FIT if they use electric heating in the day.⁷⁵ The RHI may be more helpful to this group in incentivising renewable heating technologies which they can have cost-effectively installed through new investment models.

The FIT grants an opportunity for social housing providers to raise the finance to rectify the imbalance between those able to pay for microgeneration, and those who cannot. Social housing accounts for around one fifth of UK building stock, and the new incentives on renewables and efficiency provide levers for affordable retrofits which can make a significant difference on fuel poverty, as evidenced by the major organisations taking a lead.

Behavioural Change

Part of the rationale for introducing the FIT was behaviour change around energy use. As above, the rationale contains numerous references to participation by citizens, communities and other non-traditional energy generators, but the impact assessment is explicit: "The objective of FITs is to contribute to the UK's 2020 renewable energy target and carbon saving targets through greater take-up of low carbon electricity generation at the small scale and to achieve a level of public engagement that will engender widespread behavioural change. This is intended to result in a better understanding of energy use and acceptance of renewable energy technologies".⁷⁶

A constant in the interviews undertaken during this research concerned the awareness raised in people who generate their own energy. The FIT creates an incentive to maximise the differential between energy outgoings and income. Smart meters – expected to begin rolling out from 2012 onwards - will provide visible real-time displays which alert customers to their energy use, and allow them to understand which appliances are more energy-intensive. This can be linked to time-of-day use, which can better balance supply and demand. Again using the example of PV, its generation during daylight, and the policy bias towards on-site consumption, together with a peak electricity tariff, should result in a strong shift to using energy-intensive appliances during the day. The understanding of how time-of-day affects energy bills is also empowering for users, and counteracts the traditional "detachment between flicking a switch and getting a bill".⁷⁷ This is win-

win situation, as influencing behaviour and managing the demand side of energy is critical in the low carbon transition process.

Personal experience of being in an energy-positive house, which generates more energy than it consumes, underlined the immediate shift in behaviour arising from increased awareness of the relationship between ourselves, energy saving and use, and renewable energy. The effect is truly instantaneous, knowing that the less energy one consumes, the more the house will benefit financially. It also conveys a very positive sense of making no impact on the climate or environment.

The Energy Saving Trust (EST) will be doing some work for DECC in 2011 on behaviour change arising from the FIT. This will look at how FITs affect individual's interest in installing microgeneration, and will feed into understanding for the government consultation on renewable energy.⁷⁸ Recording the actual qualitative and quantitative shifts will be extremely useful in guiding the development of UK energy policy.

EST report that microgeneration enquiries have jumped from 5 percent of calls to 10 percent since the introduction of the FIT. Of this, one third of enquiries are on PV, representing a 600 percent increase in less than a year. Half of all microgeneration calls to the EST advice centres are on FITs, totalling around 1,500 per month, or 18,000 in a year. Typical enquiries concern financial mostly, asking how a generator claims the FIT, how much can be earned, and whether or not tax has to be paid. In the same period, there has been a marked decline in the percentage of calls on solar thermal, but this is expected to bounce back when the RHI is introduced, especially as systems cost one third of the price of PV.⁷⁹

A major study of behaviour change and micro-generation was published in 2005 by The Hub Research Consultants for The Sustainable Consumption Roundtable, a joint initiative of the National Consumer Council and the Sustainable Development Commission. Entitled 'Seeing the Light: the impact of micro-generation on the way we use energy', it was a qualitative study of attitudes, practices and behavioural change. Their findings were in line with experiences reported during this investigation: "In summary it is important to note that the impact of micro-generation may reach far beyond a simple analysis of kilowatts produced and carbon emissions averted. A whole host of attitudinal and behavioural shifts do seem to be fostered (though not automatically created) by the presence of on-site micro-generation. Some of our sample were only producing very modest levels of energy through their micro-generation technology, yet the behavioural impacts in terms of energy awareness and efficiency were often still considerable. Thus the findings from this research indicate that the qualitative impacts of micro-generation technology can be substantial, presenting a living, breathing and emotionally engaging face to energy consumption issues. In short, micro-generation can help bring the invisible to life."⁸⁰

A key point raised in the interviews was that the impact of domestic renewable technologies is closely connected to the operational knowledge of the user.⁸¹ The recent heat pump trials run by EST brought to light the point that education must be part of any installation: "Many householders said that they had difficulties understanding the instructions for operating and using their heat pump. This highlights a need for clearer and simpler customer advice".⁸² For any device, knowledge of operation is vital to optimal, safe operation. For the full benefits of the technology to be realised, and behaviour to shift accordingly, installers will need to ensure they take users through everything they will need to know. "Clearly good introductory and, ideally, ongoing communication is necessary to maximise the impact of micro-generation in such passive and even in active households".⁸³

The positive effects arising from renewables and efficiency will need to be asserted rather than the negative, as in the taking for granted of energy. In the fields of conservation, energy and green marketing, the much-discussed 'rebound effect' or 'Jevons paradox' states that energy saving can inspire excess use.⁸⁴

The Energy Saving Trust have produced two reports which highlight the fact that our behavioural changes around energy over the last few decades especially have seen an overall rise in energy use. This is because we use more and more gadgets, despite them being subject to more energy efficient design, and sometimes replacing several gadgets with one.⁸⁵ The matter of how we use energy culturally is of major importance. Japan's famed vending machines – selling everything from toys to beer – are said to require the energy of two nuclear power stations to run.

Finally, as many have argued, the FIT is enabling visual signals to proliferate in urban spaces, signals of the new direction for energy, and its participatory nature. Behaviour change can be given a psycho-social 'nudge'

by demonstrating the technology in public. This approach, popularised by the authors of the book *Nudge* by Richard Thaler and Cass Sunstein, is referred to as libertarian, soft or asymmetric paternalism. It is a political philosophy which “believes the state can help you make the choices you would make for yourself—if only you had the strength of will as well as the sharpness of mind. But unlike 'hard' paternalists, who ban some things and mandate others, the softer kind aims only to skew your decisions, without infringing greatly on your freedom of choice”.⁸⁶

Therefore, the FIT could be seen as hard paternalism in that no choice is given on whether or not an energy user contributes towards investment in renewable energy. Or, could it be seen more as soft paternalism in that the major decision on personal investment (and personal gain) is a matter of individual choice?

All this matters greatly as the energy transition requires that as many different parts of society as possible play a role in taking us forward, as spelled out in the rationale for the policy. It is obviously desirable if this is done so willingly. The investments that we require run into many billions annually to cover the energy gap that will open up over the next decade, with eight nuclear and six coal-fired power stations coming offline.⁸⁷ This amounts to some 25GW, or around 30 percent of total generating capacity.⁸⁸ As such, a positive public response is vital.

The normalisation of using renewable energy and energy efficiency measures in public and private buildings of all types is a concrete step towards reduced energy demand, if it succeeds in overcoming the false sense of plenty that it may engender. Further, an appreciation of the complexity of human behaviour, and behavioural change, is vital for government to bring to policy design. This author has argued that there is a risk that if policies are sold primarily on the basis of making or saving money, the message is that money is good, rather than that sustainability is good. It reinforces the idea of the individual as consumer, rather than citizen. Further, this can actively undermine one's intrinsic motivations, such as self-actualisation and community belonging.⁸⁹

Industrial Policy

In the course of this study, questions arose regarding the government's level of ambition on small-scale renewables, and its intentions on renewable policy as industrial policy more broadly. In interviews with civil servants working on this agenda, it was abundantly clear that there is a huge desire to take forward industrial development of certain large-scale generation technologies, as well as incentivisation of community wind, but there is much less focus on small-scale, and on more mature technologies in general. Study was made of the areas where the UK holds competitive advantage, and policy and strategy are being designed around this.

The technologies that were identified are largely offshore wind and marine (wave and tidal) technologies, with some interest in geothermal, particularly heat pumps, and some R&D in solar.⁹⁰ Significant government investment is being put into offshore wind supply chains, and into various areas of development, manufacturing and deployment, in an attempt to capture as much economic value as possible from renewables and climate change policies.

Given the need to produce large amounts of energy from new installations, and to extract economic benefit from doing so (for both private enterprise and the public exchequer), industrial policy is being shaped to help deliver both. The government recognises it can play an early stage role in the development of these alternative technologies, and appears committed to doing so, with a joined-up cross-department approach. Teams on renewables strategy and delivery are formed from civil servants at both DECC and the Department for Business, Innovation and Skills (BIS), and there is work on biomass with DEFRA (Department for Environment, Food and Rural Affairs) and on community energy with DCLG (Department for Communities and Local Government).

One aspect of manufacturing in the strategy is the attraction of OEMs – original equipment manufacturers. Market-leading companies are being invited to set up facilities here so that even if UK companies do not own the intellectual property rights to new technology or manufacturing patents, the home nations can still welcome new jobs and industries through inward investment by foreign companies. When Ontario introduced their feed-in tariffs in 2009, within a year they had attracted billions of dollars of investment from large renewables manufacturers, and “The domestic content requirement has already resulted in the promise of

43,000 jobs and dozens of new manufacturing plants to support the 5,000 MW of new clean energy".⁹¹ While the UK may have trouble with a domestic content rule – and Ontario have been taken to the World Trade Organisation by Japan on this – setting in place the conditions to encourage national manufacturing can help to further embed public and therefore political support for the industry. Another benefit is the potential for rebalancing economy and geography, as the spatial spread of the industry, by its very nature, allows for more jobs to be created more widely.

A senior figure at BIS said that the UK did not wish to repeat the mistakes of the 1980s, when its lead on wind technology development was lost to Denmark.⁹² This happened because the research and development (R&D) work was done, but not the industrial development. It seems evident that the current administration is determined to succeed in this area, and that the civil servants tasked with delivery are capable, committed and being supported in their efforts. This feels a very different picture from just five years ago, but then the economic recession and the looming energy gap, as well as the global phenomenon of peak oil, are all urgent push factors on the policy front. Just this morning (8 February 2011) an article in The Guardian newspaper discussed Wikileaks cables from US diplomats in Saudi Arabia saying were being informed by insiders that the Saudi oil reserves were being overestimated by as much as 40 percent. If correct, this brings much closer the onset of uncontrollable and unaffordable oil prices.⁹³

DECC civil servants have also reported very encouraging planned and developing activities on renewables. The new renewable energy roadmap, The Carbon Plan, has just been released in draft form, with a final version due in the autumn.⁹⁴ It is intended to be a participatory, iterative process, helping to flesh out the delivery of the 2009 renewable energy strategy. It may also feature an interactive online platform to open up the discussion and activities around the accelerated deployment of renewable energy in the UK. The methodology will undoubtedly evolve, but focus on openness, discussion, consultation and the systematic building of knowledge and experience in order to identify barriers to deployment of lead technologies, and identify bespoke actions to remove them over time.⁹⁵

Job creation is expected to be very significant in the industry across various sectors over the next few decades, with 500,000 direct and indirect jobs being produced by 2020. The opportunities exist not only for established companies, but also for those in other sectors to expand into renewables, such as fossil energy, aerospace, advanced manufacturing and other high-tech areas.⁹⁶ Adding value is something the UK economy has come to do increasingly as the emerging economies take up low-end manufacturing at much lower cost.

The government is in the process of consulting on major reform of the electricity market, given the imperatives of delivering a large volume of reliable, affordable low carbon generation within the next two decades. The proposals include a floor price for carbon, an Emissions Performance Standard which will effectively exclude new coal-fired power stations, an incentive for ensuring back-up generation capacity and a mechanism to guarantee prices for low carbon generation. This reform process should have a major bearing on the sector, and a White Paper will be issued in late Spring 2011.⁹⁷

There are concerns that the reforms could damage or destroy the competitive electricity market which has developed over the last 20 years, which could raise costs for consumers. Given that significant energy price rises are a constant in the UK, this view will certainly be heard during the reform process. As in any major economic restructuring of this kind, it will be a battle.

The move to more decentralised generation fits with the government's professed desire to move power out to the people, and away from the centre. Even some of the centralised investments are to an extent decentralised, such as onshore and offshore wind farms. But how much a decentralised approach can come from what is still a highly centralised market depending on major physical infrastructure is open to debate. The UK's 'free' electricity market, often seen as a model for other countries, is still a very consolidated one, a state system run by private companies.⁹⁸ The telecommunications industry was broken up much more, much sooner, by contrast. However, the nature of energy infrastructure as we know it is similar to road and rail – there is comparatively limited scope for traditional competition in sectors which have a major physical presence in the landscape.

Whether or not these reforms will destabilise or threaten the FIT or other incentives for small-scale renewables remains to be seen. It has been forcefully argued that any retrospective cuts to the FIT, as occurred in Spain in 2010, would irreparably damage investor confidence in the UK renewables sector,

something that would come back to haunt ministers and the nation as a whole.⁹⁹ Investors are already pulling out of deals in the UK over the early review, and some in Spain are taking legal action.¹⁰⁰

This author has studied and argued for feed-in tariffs in many countries in recent years, and over time it has become increasingly clear that in order to have any chance of developing a sustainable economy, all of society must participate in the transition, and therefore have a stake in doing so. Under the right conditions, the national constituency supportive of a greener economy grows, the national mindset adjusts to the direction of travel, and more innovators, entrepreneurs and investors emerge, smoothing and accelerating the process. This speaks directly to the government's desire to "bring about a power shift, taking power away from Whitehall and putting it into the hands of people and communities, and a horizon shift, making the decisions that will equip Britain for long term success. For too long citizens have been treated as passive recipients of centralised, standardised services. This Government is putting citizens back in charge, and Structural Reform Plans are part of this shift of power from government to people". FITs can facilitate this very successfully if well designed and implemented, and left alone by government to develop.

What is taking shape is a more holistic view of the energy transition, as a participatory process which looks to extract value at all levels, and allow as many actors as possible to become investors, generators or employees in the sector. It also creates opportunities to bring about a whole new understanding of energy, and a closer relationship with it, something rarely seen since the electrification of lighting began in the late 19th century.

Recommendations

The policy lessons that have arisen from studying the UK FIT to date are unsurprisingly found largely around the treatment of the technologies and the groups who use them. Among the messages for government are some fascinating and occasionally unexpected observations in addition to the more predictable comments.

An interesting point raised concerned the lack of access to the full FIT for early adopters. Pre-FIT installations get 9p per kWh only (as well as the 3p per kWh export tariff), compared to the full 41.3p. The government makes it clear that those who benefitted from a grant should not get a double payment. However, the suggestion was made that the grant could be paid back, and then the full FIT claimed. The preferred option was a bigger FIT than the 9p per kWh, but grant repayment was a strong recommendation.¹⁰¹ There is even a campaign on this matter - 'Fair Treatment for All Microgenerators' - with website. Their calculations show that, when comparing an early adopter with a FIT-eligible household, the former will see a net loss of £5,257 while the latter will make a net gain of £9,432.¹⁰²

A real concern was the loss of fuel poverty and social housing opportunities if the FIT was removed or significantly reduced for larger installations. The government announcements regarding solar parks are creating concern and uncertainty among those looking to offer community benefit models. They are hopeful that government will understand and accept the difference, and provide security for their initiatives. A separation of tariff levels was recommended. Again, these uses of the FIT can be seen as effectively rebalancing the social costs and benefits of the policy.

The raft of forthcoming tools for promoting renewables includes the Green Deal (an efficiency mechanism), the Green Investment Bank (for low carbon project funding) and the Renewable Heat Incentive (a FIT-type mechanism for renewable heat). Perhaps the most common hope voiced by interviewees, across all sectors, was that these and all energy policies would be effectively harmonised. Government is clearly aware of the need to have all these incentives working together, and it has been suggested in public: "a senior conservative declared that ... green measures had to be pursued together because they formed a "coherent whole" ... [Oliver] Letwin ... listed many of the government's policies and promises, including the Green New Deal for a big increase in energy efficiency, building a smart grid, electric vehicles, generating energy from waste, feed in tariffs, carbon price support, and carbon capture and storage for fossil fuels".¹⁰³

The Green Deal is particularly important, especially in terms of its relationship with the FIT. It is a 'pay as you save' energy efficiency policy which seeks to shorten the payback on efficiency measures. Efficiency retrofit measures will be funded by a loan, and the loan repaid through energy bills. What is fundamental is that the repayments must be less than the savings, otherwise it does not work financially.¹⁰⁴ However, the efficiency requirements – and hence the repayments - for certain 'hard to treat' properties may be very large, so the

policy may have limited application.

The policy is also complex. As with fixing a FIT to a property via PV, what happens to the Green Deal debt when property ownership changes? And how should the debt be collected? The original plans suggested that energy companies collect the debt on behalf of financiers. But, what if it becomes a bad debt? The energy company could then have a bad debt on their balance sheet which is not effectively a debt to them, so they are taking the risk while the financier gets the reward. The issues around money flows, risks and administration procedures are under discussion at the time of writing.¹⁰⁵

The Minister of State for Energy and Climate Change, Greg Barker, referred to the Green Deal when uttering this instant classic on behaviour change: "If someone decides, in their newly insulated home, to turn up the dial and Hoover in the nude, that will affect the energy bill".¹⁰⁶ At a stroke, 'hoovering in the nude' has become the defining image for the 'rebound effect' mentioned above in the section on behaviour change. Communication from as many sources as possible on reducing energy use will be useful in countering this, but rising fuel costs, and smart meters which give people a better idea of how much energy they are using, may be more effective.¹⁰⁷

Communication on the FIT should include the wider economic benefit of reduced energy imports, and the reduction of the market price of electricity through the 'merit order effect'.¹⁰⁸ Germany saves around five billion euros annually through renewables depressing the market price. European countries with high wind penetration have saved an estimated 3 to 23 euros per megawatt hour on this basis.¹⁰⁹ This is because wind has no marginal costs, i.e. fuel inputs, and as it can more cheaply supply the grid at peak times, it becomes the preferred energy source. Due to its lower cost on the spot market, the average unit price of electricity is therefore reduced.

It was often stated by interviewees that the banks have not caught up with the policy. Some averred that due to the financial crisis and its lingering macro- and micro-economic effects, banks are still in 'capital recovery mode', and less interested in making fresh loans. Building the market steadily through secure, government-backed policies like the FIT should help get banks more comfortable with the sector. It will undoubtedly take some time before attractive, tailored renewables loans become mainstream in the same way as they are for cars, for example, but microgeneration loans, when realising guaranteed returns of 8-12 percent, should become more usual over the next few years. They may emerge via top-ups on mortgages at first, but this will all depend on the future attractiveness of the tariff rates.

Although people are now receiving their FIT payments, there is a question over shifting from largely quarterly payments to monthly payments. This would clarify for users the difference between import costs and generation and export payments. Another suggestion in this area was to have one single monthly energy bill, for import and export, including generation. Having all the numbers on one easy to read bill – along with a handy note of the previous year's figures – would again make the process of tracking progress easier.

Communication was a common thread in all conversations, and is especially pertinent with regard to teaching householders everything they need to know about operation of their renewable technology. This may be even more important in social housing, as tenants will not have initiated the installation. In a study of savings through efficiency and education, it was found that only by doing both can significant energy savings be made. Both are necessary, but by themselves insufficient to make the difference.¹¹⁰

Another major finding is that the government has a huge amount of work going into development of the renewables industry, looking at policy, finance, infrastructure, R&D, business development, export markets, skills training, community power and so on. However, little of this seems to be reaching the mainstream media, or the public at large. The work being done on the renewables roadmap may help to draw more of society into the discussion, but government has a fundamental problem with public trust which will always be challenging, especially in the current climate of dramatic spending cuts to alleviate a record-breaking national debt. Finding trusted proxies to communicate directly with the public will be crucial. These include the Energy Saving Trust, Carbon Trust and other advice centres, as well as NGOs, charities and community groups working in the sector. This is an area that will require ongoing development. At least there is an understanding that government support for decentralised energy is vital: "Without the confidence that comes from ambitious declarations of support from government, it could yet wither on the vine".¹¹¹

Several interviewees raised the question of whether or not a single visit approach could work for energy assessments. An ideal situation for some is that domestic properties should get the full assessment done in one day, on efficiency and renewables retrofits. This would save a number of visits, and take a holistic view of the energy issues for both tenant(s) and property. For others, this would present multiple problems: people are too busy to take that much time off work; it would be confusing to have so many different things to investigate in one visit; and it would cost too much to pay such a highly trained and knowledgeable individual or individuals.

The matter of the FIT being tied to tax reviews flies in the face of good practice on FIT design, as it fundamentally undermines the central function of the policy: to ensure stability. It is considered a tax on public expenditure because it is a compulsory levy on fuel bills. However, the UK operates under a system which seeks to avoid stealth taxes being hidden in the public finances, and which must ensure that policies do not contravene European Union state aid rules.¹¹² Slovenia had considerable trouble with the design of their FIT in this regard, so there is precedent. Therefore, this will most likely remain the situation going forward, and other investor guarantees will need to be made.

On the basis of controlling scheme costs better, the review and degression of the FIT, it is argued, could be tied to volume rather than time. Cost and predictability could be better balanced this way, de-risking the FIT from both government and investor perspectives. If an early review is to be done, it should be done to a fixed timetable and leave six months at least before implementation, to provide the opportunity for developers to plan in advance.¹¹³

A major red flag is the subject of retroactive cuts. Described as an “unmitigated confidence disaster for any government” by one commentator, this idea brought strong reactions from all those who discussed it in interview. The findings of Ernst and Young were quoted in this context, who said that if just one percentage point is added on the basis of perceived investment risk, it would add £2 billion per year to the estimated £200 billion needed in national low carbon spending. A letter on the subject was sent to senior government figures in the run up to the comprehensive spending review in 2010, with 64 signatories, all CEOs of renewable energy companies, making this point that the sovereign risk implications for UK decarbonisation policy are profound. And it may go beyond renewable energy investment.¹¹⁴ Interviewees reported numerous occasions where investor confidence was disturbed by government uncertainty over green policies.

The number one response to the final interview question on what changes interviewees would like to see to the policy in future, was one word: stability. This was raised in virtually every conversation, no matter what their relationship with the policy. It has been mentioned numerous times in this study, and was again underlined in a new article as this paragraph was being written.¹¹⁵

It cannot be stressed enough that the renewable energy industry has been struggling for stable growth conditions since its inception. Government and public attitudes as well as competition from the traditional energy sectors has hampered growth and development, but given the multiple social, economic and environmental benefits of renewable energy, it must be finally given a clear road for development and deployment at scale.

In my view, the most interesting point raised during the course of this study, was that the main challenge in this energy transition is that everything needs to be done at once. It would not be such a difficulty to deliver parts of what is necessary, but instead there is a laundry list of items to deliver at the same time: finance, awareness raising, infrastructure, technology, smart meters, super grids, storage, market reform, planning and so on. All this in a time of economic recession.

Conclusions

The inspiration to undertake this research came from a conference in Ontario on their FIT, and recent time spent working with a charity based in Bristol, England, called The Converging World (TCW). Colleagues in Ontario face an election year in which right wing conservatives wish to push back on renewable energy and the FIT, just as the province is establishing a major new global market for renewables. It seems evident that there is a need to study and communicate the benefits of this more widely. It would be a catastrophe if renewable energy was to be set back yet again due to narrow, short-term political and economic interests. The same is true in the UK.

TCW runs a community energy programme funded by investments in wind power in India. During that time, there were suddenly so many energy and sustainability events taking place around the city from week to week that one would see familiar faces regularly, forge friendships, create new project ideas, and learn and share a great deal. Community energy financing, renewables and efficiency retrofit programmes, creating a national greentech hub, hosting an annual international green week and developing a sustainable city region are just some of the ambitious projects that emerged in just one year. The tables below illustrate the point that this policy ties together a great many actors, some of whom may not normally work together.

Table 2: Examples of Actors Engaged with FITs

<i>Public and Third sector</i>	<i>Business</i>	<i>Government</i>
Citizens Community groups Schools Charities NGOs Community Interest Companies (CICs)	Entrepreneurs SMEs Farmers Trades Large companies Universities (R&D) Financial sector Legal firms Insurance companies Service sector Architects	Central government Local authorities

It became evident that the FIT was largely responsible for this new energy invigorating all those who wished to make a local contribution to sustainability. Across all ages, all racial, social and professional backgrounds, people were coming together to find ways to work on making the city more energy efficient and low carbon. It seems true to say that there has been more activity in the city on this broad set of interlinked agendas than at any time previously. This study gave the strong impression that this was an accurate reflection of the national picture.

The table below summarises some of the benefits accruing to different parts of society from using the FIT, and it is by no means exhaustive. Social, political and economic benefits all arise and interact. The policy gives real momentum to the energy initiatives that people have wished to pursue. Now that the market is finally developing, and awareness spreading, these benefits will be enhanced, so long as the policy environment enjoys sufficient stability. After all, this is a dynamic, fast-moving subject. Many new announcements have been made during the six weeks of this investigation, mainly on policy review and finance. Therefore, we are still some way from an objective measure of policy stability.

Table 3: Benefits of FITs¹⁶

<i>Social</i>	<i>Economic</i>	<i>Political</i>	<i>Integrated</i>
Awareness raising Behavioural change Citizen engagement Social cohesion Community empowerment Charity/ NGO facilitation and communication roles Energy education Encourage energy efficiency Opportunity to combat fuel poverty	SME opportunities Entrepreneurial opportunity Investment security and expansion Technological innovation Supply chain development Local business support Farming opportunities Green job creation Domestic manufacturing and export opportunities Create hedge against fuel price volatility Reduce renewable	Demonstrate commitment to low carbon economy Cooperation among varied actors Public engagement Meeting targets on energy and carbon Decentralisation	Interaction of all actors Overall carbon reduction Increased energy security Increased local resilience Reduced pollution

	energy costs		
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What has been most marked about the development of the FIT is its capacity to enact participation, that most critical of factors in driving the transition to a more sustainable economy.¹¹⁷ This is where the policy can excel: facilitating broad societal participation in sustainability. Without people having a reason and a way to contribute, societies cannot expect to make the necessary carbon cuts in time or secure domestic energy supplies to maintain or enhance their standard of living. The process is now firmly underway, as the above demonstrates. In a democracy, things will simply move too slowly without government, business and the third sector contributing, and facilitating public engagement.

The awareness factor is also critical. PV, for example, has a habit of making people “evangelical” about energy use quite quickly. When people quantify a kilowatt-hour, and what it is worth, they tend to go into a reduction policy. Microgeneration has the ability to enhance our appreciation of what energy is, where it comes from and how to use it.¹¹⁸ The FIT is now allowing this knowledge to spread throughout the UK, into homes, schools, social housing, farms, factories and offices. If it can ensure stable, joined-up policy and a real government commitment for the long-term, the UK can expect major success with its renewable energy programme going forward.

Appendix

Table 4: FIT Levels for Systems Installed Before April 2012

Technology	System Size	Tariff (pence/kW) Apr 2010-Mar 31 2011	Revised Tariff Apr 2011-Mar 31 2012*	Duration (years)
Anaerobic Digestion	≤500kW	11.5	12.1	20
Anaerobic Digestion	>500kW	9	9.4	20
Hydro	≤15kW	19.9	20.9	20
Hydro	15-100kW	17.8	18.7	20
Hydro	100kW-2MW	11	11.5	20
Hydro	2-5MW	4.5	4.7	20
Micro-CHP [B]	<2kW	10	10.5	10
Solar PV	≤4kW [new] [C]	36.1	37.8	25
Solar PV	≤4kW [retrofit] [C]	41.3	43.3	25
Solar PV	>4-10kW	36.1	37.8	25
Solar PV	10-100kW	31.4	32.9	25
Solar PV	>100kW-5MW	29.3	30.7	25
Solar PV	Stand-alone [C]	29.3	30.7	25
Wind	≤1.5kW	34.5	36.2	20
Wind	1.5-15kW	26.7	28	20
Wind	15-100kW	24.1	25.3	20
Wind	100-500kW	18.8	19.7	20
Wind	500kW-1.5MW	9.4	9.9	20
Wind	1.5-5MW	4.5	4.7	20
Existing generators transferred from RO		9	9.4	To 2020
Export tariff		3	3.1	

* Adjusted by the 2010 Retail Price Index of 4.8%

Notes:

[A]: These tariffs are index-linked for inflation.

[B]: This tariff is available only for 30,000 micro-CHP installations, subject to a review when 12,000 units have been installed.

[C]: These terms are defined as follows:

- "Retrofit" means installed on a building which is already occupied
- "New Build" means where installed on a new building before first occupation
- "Stand-alone" means not attached to a building and not wired to provide electricity to an occupied building

Once a system has been registered, the tariff levels are guaranteed for the period of the tariff and index-linked as described above. For systems registered in future years, some tariff levels will be adjusted to account for expected reductions in system prices, as further described here. For household customers producing energy mainly for their own use, the tariff income is also free from income tax.

Taken from <http://www.fitariffs.co.uk/eligible/levels/> and <http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=16&refer=Sustainability/Environment/fits>.

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